

Milena L. Mandić<sup>1</sup>Srećko Tomas<sup>2</sup>Drago Šubarić<sup>3</sup>

**FROM THE FIRST RUŽIČKA DAYS**  
(Borovo, December 7 – 8, 1978)  
**TO THE SIXTEENTH RUŽIČKA DAYS**  
(Vukovar, September 21 – 23, 2016)

<sup>1</sup>Croatian Academy of Engineering (HATZ), Department of Bioprocess Engineering

<sup>2</sup>HATZ, Department of Chemical Engineering, Faculty of Food Technology, Osijek

<sup>3</sup>HATZ, Department of Bioprocess Engineering, Faculty of Food Technology, Osijek

In the period between 1901 and 2014, the Nobel Prize for chemistry was awarded 106 times (it was not awarded for 8 years during that period), and among the laureates were two Croats, **Leopold Ružička** (1939) and Vladimir Prelog (1975). **Ružička** was born in Vukovar, in September 1887. His father's name was Stjepan, a cooper by trade, and his mother's name was Amalija, nee Sever. His father was of Croatian and Czech descent, but a true Croatian patriot, and his mother was of Croatian and German descent. Stjepan Ružička died when **Leopold** was four, after which the Ružička family moved to Osijek, the birthplace of his mother. **Leopold** attended elementary school and classical grammar school in Osijek (Royal Great Grammar School in Tvrđa (fortress), now Mathematical Grammar School).

After completing grammar school in Osijek, **Ružička** decided to continue his studies outside of Austria-Hungary because of the disadvantaged position of the Slavic population in the country. Due to his modest financial means, **Ružička** decided to complete his studies as quickly as possible, and after only two years of studies he graduated from the Institute of Technology in Karlsruhe with a diploma paper titled "The Reaction Kinetics of Ketene" (1908). Immediately after graduating he continued working on his doctoral dissertation from the area of preparative organic chemistry at the same institution of higher education. He received his PhD in 1910 with a dissertation titled "Über Phenylmethylketen". From 1912 he worked at the Federal Institute of Technology (ETH) in Zurich, Switzerland and became a Swiss citizen in 1917. In 1918 he became a private assistant professor at ETH and in 1920 an assistant professor at the University of Zurich. He became a titular professor at ETH in 1923. After that, his cooperation with the commercial sector also intensified. In 1929 he became the head of the Laboratory of Organic Chemistry, and he remained at that position until he retired in 1957.

Near the end of his life he started writing an autobiography, but he managed to publish only an autobiographical article "In the Borderline between Bioorganic Chemistry and Biochemistry".

**Ružička's** success, indirectly linked with Prelog, made it possible for researchers from Croatia, for doctoral students and other specialists to temporary work in the Laboratory of Organic Chemistry throughout Prelog's working life at the ETH, from 1942 to 1976, but also after his retirement. **Ružička's** other associates, besides Prelog, were Oscar Jeger and Stanko Borčić. Stanko Borčić (1931-1994) wrote his dissertation under **Ružička's** and Prelog's mentorship. He was an excellent organic chemist who gave his contribution to the Ruder Bošković Institute at first, and later as a university professor at the Faculty of Pharmacy and Biochemistry in Zagreb.

Branimir Gašpert (1928) and Vitomir Šunjić (1939) also shared their experiences from the ETH to the Ruder Bošković Institute. Gašpert (he was in Zurich in 1967/68) belonged to the second generation of Prelog's students and in the group were also Dušan Dvornik, Mirko Ternbach, Berislav Glunčić (1929-2013), Rade Marušić i Žarko Stojanac. The third generation of Prelog's students included Vitomir Šunjić, Davor Bedeković, Nada Šarčević, Mladen Žinić, Krunoslav Kovačević, Stjepan Mutak, Miljenko Dumić and Mićo Kovačević. Results of scientific research were patented by many of them. When talking about Pliva's scientists and Croatian scientific biography (CROSBI), the name of Berislav Glunčić has been related to 11 patents, published in the Croatian Patent Bulletin. The owner of those patents, along with Glunčić, has often been Krunoslav Kovačević, who also worked in **Ružička's** and Prelog's Laboratory of Organic Chemistry in Zurich.

Vitomir Šunjić resided in Zurich from 1969 to 1970. Mladen Žinić (1947), another prominent Croatian scientist, resided in Zürich in 1977 and 1978. Davor Bedeko-

vić, one of Prelog's last postgraduate students, worked at ETH University from 1972 to 1976. He also worked at Ciba-Geigy AG and then as a professor in Canada.

Encouraged by the Society of Chemists and Technologists in 1989, University of Osijek awarded Vladimir Prelog with an honorary doctorate. The 6th Ružička Days, opened by Prelog, were held at that time in Osijek. One of the most touching moments during Prelog's stay in Osijek was the award of an honorary doctorate at the University of Osijek, as well as the exhibition of the medallions awarded to two Nobel Prize winners in the lobby of the grammar school, attended by the Nobel laureates **Leopold Ružička** and Vladimir Prelog. Since the medallions are still exhibited in the lobby of the grammar school in Osijek, it is likely to be expected that in every generation of pupils at least one will be inspired for enthusiasm and diligence in further education.

With his work, **Ružička** established his reputation not only as a great scientist but as a true Croatian patriot. That was the reason why a group of scientists during the 1970s got the idea to commemorate the exceptional scientist, Nobel Prize winner, **Leopold Ružička**, so he can remain in our memories and be an inspiration for future generations. That is how Ružička Days were started in 1978.

During spring of 1977 an idea about organizing a scientific conference Ružička Days was born, according to the Academician Nenad Trinajstić, at a meeting at the Faculty of Food Technology and Biotechnology, University of Zagreb, attended by Vera Johanides, Nenad Trinajstić, Leo Klasnic and Vlado Horvat in Professor Johanides' office, a native of Vukovar. The Conference was to be organized in Vukovar, the birth town of the first Croatian Nobel Prize winner.

The idea about holding Ružička Days in Vukovar was proved to be excellent since even the military aggression on Croatia in 1991 could not prevent its implementation. During the aggression on the Republic of Croatia, the Seventh Ružička Days were held at the Bizovac Spa in 1993, instead in Vukovar in 1991. The Eighth Ružička Days were also held at the same location in 1996. After the peaceful reintegration of the Croatian Danube Region, the Ninth Ružička Days could be organised in Vukovar in 1998, where the conference is still held.



Participants of the First Ružička Days

## Overview of the Ružička Days

	Year and place of organisation
I	1978 Vukovar
II	1980 Vukovar
III	1982 Vukovar
IV	1984 Vukovar
V	1986 Vukovar
VI	1989 Osijek
VII	1993 Bizovac Spa
VIII	1996 Bizovac Spa
IX	1998 Vukovar
X	2000 Vukovar
XI	2004 Vukovar
XII	2008 Vukovar
XIII	2010 Vukovar
XIV	2012 Vukovar
XV	2014 Vukovar

### *The First Ružička Days, 1978*

The papers from the 1st Ružička Days were not printed in the conference proceedings.

### *The Second Ružička Days, 1980*

The Second Ružička Days had a theme: *Medium and long term approach to resolving raw material bases and industrial polymer processing*. Based on previous experience, this time the presentations were printed in the proceedings.

### *The Third Ružička Days, 1982*

Initiators of Ružička Days were active here as well. So the head of the Organizing Committee was Vladimir Husar and the moderator of the round table was Vera Johanides. The theme was *Industry research and cooperation with scientific and scientific-teaching institutions*. The Ružička Days were clearly gaining momentum, so the presentations by professionals and scientists from Croatia, Slovenia and Serbia were held.

A noted presentation titled *Ružička's cooperation with industry* was presented by the special guest of the Conference, Nobel Prize winner Vladimir Prelog.

### *The Fourth Ružička Days, 1984*

This year, the theme was not defined upfront. The book of papers was published, and among section chairs were Dragutin Fleš and Ivan Bitula. Plenary lecture was held by Academician Ivan Jurković, while Zvonimir Janović, a member of the Croatian Academy of Engineering, held

a lecture entitled "Experiences and perspectives of the development of a personal technology in the field of polymer materials". Experts from other republics of former Yugoslavia also participated at the conference.

### ***The Fifth Ružička Days, 1986***

The theme of the Fifth Ružička Days was *Dependency of the development of chemical industry on energy and raw materials*, and the topic of the round table was *Personnel until the year 2000*. Plenary presentation titled *Thoughts about the energy perspective of Yugoslavia* was delivered by Hrvoje Požar.

At the round table, the introductory discussion was presented by Uroš Peruško, Igor Dekanić, Ante Milović, Mirko Krnić, and Dušan Gajari. The registered participant in the discussion was Egon Bauman, and the moderator was Ivan Butula.

### ***The Sixth Ružička Days, 1989***

At the time when the Sixth Ružička Days were to be organized, the will to organise such an event at the company Borovo was lacking. At the same time, the Society of Chemists and Technologists Osijek was celebrating the 25<sup>th</sup> anniversary of its founding, so, along with all the other events marking this commemorating worthy milestone, they took over the organization of the Sixth Ružička Days. Other organizers of the conference were: Union of Chemists and Technologists of Croatia, Union of Societies of Engineers and Technicians Osijek, Society of Chemists and Technologists Belišće, Society of Engineers and Technicians Borovo, Faculty of Food Technology Osijek, Faculty of Agriculture in Osijek, Institute for Health Protection Osijek, and the Scientific Department for Clinical-Medical Research of the Osijek General Hospital.

The following presentations were also delivered:

- E. Schwinum, Bayer AG Leverkusen, BRD: The increasing importance of special rubbers in western Europe;
- V. Prelog: Chemistry in Osijek 1919 – 1921.

### ***The Seventh Ružička Days, 1993***

This Conference was held in Bizovac since Vukovar was still occupied by the enemy, and the war was still present in the surrounding area of Osijek. The event included the 7<sup>th</sup> Ružička Days, the 4<sup>th</sup> Conference of Chemists and Technologists of Slavonia and Barania, and the 6<sup>th</sup> Professional Meeting of Chemists-Analysts of Slavonia and Barania. The organizers were the Society of Chemists and Technologists Belišće in cooperation with societies from Borovo and Osijek and the Croatian Society of

Chemical Engineers and Technologists. The honorary chairman was Vladimir Prelog.

The plenary presentation *Ružička and Paracelsus* was delivered by a true patriot, former Olympic athlete, Žarko Dolinar MD, who worked in Switzerland and cooperated with Ružička and Prelog. On that occasion he said and wrote: *Ružička was the honorary president and donor of the Croatian Foundation against the Homeland War, as well as the honorary chairman of the first branch of Matica Hrvatska in the period 1968/1969, so we communicated in the final years of his very vital and fulfilled life. During all meetings, correspondences, or telephone conversations Ružička was immensely eloquent, enterprising, vital, impatient, with abundance of comparisons, corrections, and critiques.*

### ***The Eighth Ružička Days, 1996***

This conference was also held in Bizovac, sponsored by the Ministry of Science and Technology of the Republic of Croatia, Ministry of Development and Reconstruction of the Republic of Croatia, Osijek-Barania County, Vukovar-Srijem County, University of Osijek. The co-organizers were the Society of Chemists and Technologists Belišće and the Society of Chemists and Technologists Osijek.

The conference work was divided into sections: *Chemical synthesis, Chemical analysis, Analysis of groceries and general products, Chemical and biochemical engineering, Food technology and biotechnology, and Environment Protection*. In addition to presentations, several sections introduced posters.

From the 7<sup>th</sup> and 8<sup>th</sup> Ružička Days onward, the Faculty of Food Technology Osijek was increasingly taking initiative concerning the organization, while Ružička Days were awaiting their return to Vukovar and Borovo.

### ***The Ninth Ružička Days, 1998***

The conference, held in 1998, returned to Vukovar! It was organized by the Croatian Society of Chemical Engineers and Technologists and the Society of Chemists and Technologists Borovo. The conference was sponsored by the Ministry of Science and Technology of the Republic of Croatia.

The outstanding members of the Honorary Committee were: Smiljko Ašperger, HAZU; Žarko Dolinar, University of Zurich; Count Jakob Eltz of Vukovar, Member of Parliament; Dragutin Fleš, HAZU.

Especially noted were the following plenary presentations:

- Phillippe Sauvegrain: Mycrocyclic musks: from Nobel Prize to 21<sup>st</sup> century;
- Richard Braun: Plant biotechnology.



Members of the HATZ, Srećko Tomas, winner of the 2006 Rikard Podhorsky Award and Žaneta Ugarčić, winner of the 2009 Power of Knowledge Award, held a plenary lecture at the Fourteenth Ružička Days

### *The Tenth Ružička Days, 2000*

The conference was organized by the Croatian Society of Chemical Engineers and Technologists and the Society of Chemists and Technologists Borovo. The organizers extended a special gratitude to Vera Johanides and Dragutin Fleš for their valuable advice and assistance in organizing the special 10<sup>th</sup> Ružička Days. On this occasion, the prologue was written in Croatian but, for the first time, also in English.

The conference was sponsored by the Croatian Academy of Sciences and Arts.

During the special 10<sup>th</sup> Ružička Days the following plenary presentations were delivered:

- Pavao Pavličić, HAZU, Zagreb: Ružička and Vukovar;
- Albert Eschenmoser, ETH, Zürich: Remembering Leopold Ružička - The journey from terpenes to nucleic acids;
- Jasna Kniewald, PBF, Zagreb: Pesticides and the environment – presence and risks.

### *The Eleventh Ružička Days, 2004*

Since the conference was taking place in 2004, the time when food safety issues and the motto “from farm to table” first appeared in public forums in Croatia, the presentation by Ljiljana Primorac from the Faculty of Food Technology Osijek attracted attention.

It was organized by the Croatian Society of Chemical Engineers and Technologists, Society of Chemists and Technologists Borovo, Faculty of Food Technology Osijek, Society of Chemists and Technologists Osijek, and the Society of Chemists and Technologists Beličće.

### *The Twelfth Ružička Days, 2008*

It was held under the motto “Science and new technologies used for development of the economy”. The Chairman of the Scientific and Organizing Committee was Srećko Tomas, who was also the head editor of the Proceedings and abstracts. Srećko Tomas started with opening remarks and then Ivan Hubalek gave an overview of the eleven Ružička Days held until then, Filip Kljajić delivered a presentation titled “Vladimir Prelog and Ružička Days”. The conference also commemorated the 30 year anniversary since the first Ružička Days were held.

In addition to outstanding Croatian scientists, the following foreigner scientists delivered their presentations:

- Hartwig Höcker: Cyclics and macrocyclics-a personal review in honour of professor Leopold Ruzicka;
- Valery P. Kukhar: Biomass-renewable feedstock for organic chemicals-„white chemistry“;
- Jasmin Hirschmann and associates: Intact spore mass spectrometry for fungus identification by vacuum maldi time-of-flight mass spectrometry.

### *The Thirteenth Ružička Days, 2010*

The power of the idea about holding Ružička Days was reinforced by the fact that since the *Thirteenth Ružička Days* in 2010, the conference has become an international congress, because, along with HDKI and the Faculty of Food Technology Osijek, the European Federation of Food Science and Technology (EFFoST) became a co-organiser. Since the beginning, the conference has made big progress due to the fact that 110 plenary and 150 other presentations were delivered, 600 posters were displayed, 6 round tables were held by Nobel Prize winners, academicians, university professors, scientists, and engineers from our country and abroad. Meetings

were organized by scientific and professional committees, with 325 members in total, and there were about 2500 participants. All of that was and still is an encouragement for development of the economy and society in general, especially in the areas of chemistry, chemical and biochemical engineering, food technology, medical biochemistry, pharmacy, environmental protection, and others areas in Croatia, but also worldwide, and that is the power of knowledge working through the right ideas. *Ružička Days* is one of the ideas successfully realised.

Proceedings were published regularly, as *Ružička Days* were held, without the reviews with regards to paper categorisation. However, since the Thirteenth conference, when it became an international conference, the Proceedings have been published separately from the Book of Abstracts. All papers reviewed after the conference which elevated the conference to a new level of quality.

The Chairman of the Scientific and Organizing Committee was Drago Šubarić, a member of the Croatian Academy of Engineering (HATZ), Department of Bioprocess Engineering, who suggested the motto of the Thirteenth *Ružička Days*, which was accepted for the Fourteenth and the Fifteenth *Ružička Days*: Today Science – Tomorrow Industry. Drago Šubarić found this motto in some of *Ružička*'s materials. Vice-chairmen were Srećko Tomas, member of HATZ, Department of Chemical Engineering, and Ante Jukić. Out of the other 17 members of the Scientific and Organizing Committee, three of them were members of HATZ: Jurislav Babić, Damir Ježek, and Milena Mandić, all from the Department of Bioprocess Engineering. Many members of the Honorary Committee were also members of HATZ: Marin Hraste, Zvonimir Janović, and Gordana Kralik. This Conference, as well as the next one, was held with the support of the Croatian Academy of Engineering.

#### *The Fourteenth Ružička Days, 2012*

Along with the European Federation of Food Science and Technology (EFFoST), the Conference was held with the sponsorship of the European Association of Chemical and Molecular Science, so it attracted even more scientists to deliver section presentations and display posters.

Members of the Scientific and Organizing Committee were: Ante Jukić, chairman, vice-chairmen Drago Šubarić and Srećko Tomas, both members of HATZ, as well as 17 other members. The conference, the same as all the previous conferences, was sponsored by the Croatian Academy of Sciences and Arts. This conference, among others, was held with the support of HATZ. An exceptionally inspired presentation was delivered by a member of HATZ Srećko Tomas, with the topic Nobel Prize winner *Ružička* as a source of inspiration.



Chairman of the Scientific and Organizing Committee, Member of HATZ, winner of the 2012 Rikard Podhorsky Award Drago Šubarić (Department of Bioprocess Engineering), greeting the attendants of the 15th *Ružička Days*

Plenary presentations were delivered by Croatian and international scientists:

- Dietrich Knorr: Emerging food processing technologies: from science to applications;
- Ulrich Schubert: New sol-gel materials: from the laboratory to applications;

#### *The Fifteenth Ružička Days, 2014*

Drago Šubarić, a member of Croatian Academy of Engineering (HATZ), was the Chairman of the Scientific and Organising Committee. Srećko Tomas, Department of Chemical Engineering, also a member of HATZ, and Ante Jukić were the vice-chairmen of the Conference. The members of the Honorary Committee were Vladimir Andročec, the president of HATZ, and Marin Hraste, Zvonimir Janović and Leo Klasinc, also members of HATZ.

The conference was held with the support of one more European association: European Hygienic Engineering & Design Group, emphasizing, thus, the international prominence of *Ružička Days*.



Member of HATZ, Deputy Secretary of the Department of Bioprocess Engineering, and the envoy of the President of HATZ, Milena Mandić, greeting the attendants of the 15th *Ružička Days*

Since the conference was held with the support of HATZ, on behalf of the president Vladimir Androćec, Milena Mandić, vice secretary of Department of Bioprocess Engineering, greeted the attendants and wished productive work.

Plenary lectures were delivered by:

- Vitomir Šunjić, HAZU: From science to industry – and back;
- Josip Šimunović, Food, Bioprocessing & Nutrition Sciences, North Carolina State University: Development and commercialisation of new aseptic technologies for processing of foods and biomaterials: continuous flow microwave sterilisation and integrated systems for particle flow monitoring;
- Takanobu Higashiyama, Senior Manager, Global Product Development, NAGASE (EUROPA) GmbH: Trehaloza: Multifunctional sugar and its applications;
- Silvana Raić-Malić, University of Zagreb, Faculty of Chemical Engineering and Technology: Challenges in positron emission tomography: from synthesis to testing on mice;
- Ljubica Glavaš-Obrovac, Faculty of Medicine Osijek: Current trends in activity and selectivity profiling of therapeutic molecules.

## Conclusion

Ružička was, to a bigger or a lesser extent, directly and indirectly, a source of inspiration to numerous Croatian and world scientists. Academician Nenad Trinajstić wrote a book *100 Croatian chemists* where he presented, in short, life and work of 100 chemists – according to him, the most prominent chemical engineers in the current Croatian history. For 90 of them, as well as for many of those who did not manage to get into the group of the chosen ones, it can be said that the first Croatian Nobel laureate was for them, was in some way, a source of

inspiration and encouragement for their future life and work.

## Literature

- Balchin, Jon: *100 znanstvenika koji su promijenili svijet*, Školska knjiga, Zagreb, 2005.
- Balenović, Krešimir: *Leopold Ružička: stara domovina i kemija u Hrvatskoj 1918.-1988.*, Rad JAZU. 443; 131-198, 1989.
- Bertić, Ninoslav i Mandić, Milena L.: *50 godina Društva kemičara i tehnologa Osijek*, Society of Chemists and Technologists Osijek, Osijek, 2014.
- Grdenić, Drago: *Povijest kemije*, Novi Liber i Školska knjiga, Zagreb, 2001.
- <http://www.ptfos.unios.hr/ruzicka/2014/>
- Hubalek, Ivan: *Jedanaest "RUŽIČKINI DANA"* (crtice za povijest o 11 znanstveno-stručnih skupova održanih od 1978. do 2004. godine) In: XII. Ružička Days, Proceedings and Book of Abstracts, head editor: Srećko Tomas, Vukovar, 18. i 19. rujna 2008., pp. 3-17.
- Kadić, Ante: *Profesor Lavoslav Ružička*, Hrvatska revija, XXVII (2); 252, 1977.
- Petričević, Jure: *Nobelovac prof. Leopold Ružička 80-godišnjak*, Hrvatska revija, XVI (3-4); 323-324, 1967.
- Petričević, Jure: *Vladimir Prelog, Hrvat-Švicarac, dobitnik Nobelove nagrade za kemiju 1975.*, Hrvatska revija, XXIV (4); 597-598, 1975.
- Petričević, Jure: *Smrt profesora Lavoslava Ružičke*, Hrvatska revija, XXVI (2/3); 387-388, 1976.
- Prelog, Vladimir: *Moja 132 semestra studija kemije*, editors: Marija Kaštelan-Macan, Miljenko Dumić, Krunoslav Kovačević, Faculty of Chemical Engineering and Technology, Zagreb, 2007.
- Pšenica, Nikola: "Boravak Profesora L. Ružičke u Zagrebu od 15. do 20. ožujka", *Kemijski vjesnik*, 15-16; 92-126, 1941./1942.
- Tomas, Srećko: *Nobelovac Ružička kao izvor nadahnuća (povodom 125. godišnjice njegova rođenja, 13. rujna 1887.)*, lecture held at the opening of the XIV Ružička Days, Vukovar, 13th September 2012., published in *7. Vukovarski zbornik*, Vukovar 2012., pp. 76. – 109.
- Trinajstić, Nenad: *100 hrvatskih kemičara*, Školska knjiga, Zagreb, 2002.
- [www.Nobelprize.org](http://www.Nobelprize.org), The Official Web Site of the Nobel Prize: All Nobel Prizes in Chemistry.

English translation Antonija Šarić and Lidija Obad, Faculty of Food Technology Osijek, Croatia.